



High temperatures enhanced acute mortality effects of ambient particle pollution in the "Oven" city of Wuhan, China

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Abstract:

Background: We investigated whether the effect of air pollution on daily mortality is enhanced by high temperatures in Wuhan, China, using data from 2001 to 2004. Wuhan has been called an "oven" city because of its hot summers. Approximately 4.5 million permanent residents live in the 201-km² core area of the city. **Method:** We used a generalized additive model to analyze pollution, mortality, and covariate data. The estimates of the interaction between high temperature and air pollution were obtained from the main effects and pollutant-temperature interaction models. **Results:** We observed effects of consistently and statistically significant interactions between particulate matter $\leq 10 \mu\text{m}$ (PM₁₀) and temperature on daily nonaccidental (p Euro Surveillance (Bulletin Europeen Sur Les Maladies Transmissibles; European Communicable Disease Bulletin) 0.014), cardiovascular (p Euro Surveillance (Bulletin Europeen Sur Les Maladies Transmissibles; European Communicable Disease Bulletin) 0.007), and cardiopulmonary (p Euro Surveillance (Bulletin Europeen Sur Les Maladies Transmissibles; European Communicable Disease Bulletin) 0.014) mortality. The PM₁₀ effects were strongest on extremely high-temperature days (daily average temperature, 33.1°C), less strong on extremely low-temperature days (2.2°C), and weakest on normal-temperature days (18.0°C). The estimates of the mean percentage of change in daily mortality per 10-pg/m³ increase in PM₁₀ concentrations at the average of lags 0 and 1 day during hot temperature were 2.20% (95% confidence interval, 0.74-3.68) for nonaccidental, 3.28% (1.24-5.37) for cardiovascular, 2.35% (-0.03 to 4.78) for stroke, 3.31% (-0.22 to 6.97) for cardiac, 1.15% (-3.54% to 6.07) for respiratory, and 3.02% (1.03-5.04) for cardiopulmonary mortality. **Conclusions:** We found synergistic effects of PM₁₀ and high temperatures on daily nonaccidental, cardiovascular, and cardiopulmonary mortality in Wuhan.

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Resource Description

Exposure : ☒

weather or climate related pathway by which climate change affects health

Air Pollution, Meteorological Factors, Temperature

Air Pollution: Interaction with Temperature, Ozone, Particulate Matter, Other Air Pollution

Air Pollution (other): SO₂; NO₂

Temperature: Extreme Cold, Extreme Heat, Fluctuations

Climate Change and Human Health Literature Portal

Geographic Feature:

resource focuses on specific type of geography

Urban

Geographic Location:

resource focuses on specific location

Non-United States

Non-United States: Asia

Asian Region/Country: China

Health Impact:

specification of health effect or disease related to climate change exposure

Cardiovascular Effect, Morbidity/Mortality, Respiratory Effect

Cardiovascular Effect: Stroke, Other Cardiovascular Effect

Cardiovascular Disease (other): cardiovascular disease mortality;cardiopulmonary mortality

Respiratory Effect: Other Respiratory Effect

Respiratory Condition (other) : cardiopulmonary mortality

Resource Type:

format or standard characteristic of resource

Research Article

Timescale:

time period studied

Time Scale Unspecified